

for removing a deposited film inside a chamber, nor supplying a cleaning gas into a chamber, nor allowing the activated species to convert the deposited film into a gaseous substance, nor removing the gaseous substance from the chamber.

Niino et al. teach a cleaning method using CIF3 for removing a deposited film from an inner surface of a reaction chamber by heating the reaction chamber at a high temperature to promptly react the deposited film with CIF3 gas.

As clearly described by Niino et al. in Figures 2 and 9, Column 11, lines 21-30, Column 12, lines 39-44, and Column 13, lines 59-62, the chamber to be treated must be heated to a temperature in excess of 400° C to attain a practical etching rate. Thus, the method of Niino et al. is available only for chambers which can be heated to such a high temperature. The method of Niino et al. is not available for ordinary stainless steel or aluminum chambers of film forming apparatuses which use O-ring seals or elements such as sensors placed in the chamber, due to the vulnerability of such O-rings and elements to high temperatures. Moreover, in the case where CF4 or another fluorocarbon is used as a cleaning gas, the chamber and the elements thereof must be heated to extremely high temperatures, e.g., 1000° C for CF4. Thus, Niino et al.'s method is impossible to use for the above-stated reasons.

Claim 11 calls for a method for removing a deposited film inside a chamber, the method comprising providing a hot element in the chamber, the hot element having at least a surface which comprises platinum. The chamber is first exhausted, and the hot element is then heated. This is a very practical method as the activated species having a high reactivity with a deposited film and a long lifetime can be generated with the aid of the catalytic action of platinum by selecting an appropriate cleaning gas. This makes it possible to effectively remove deposited films at a practical rate. Applicant's cleaning method as called for in claim 11 is completely different from the method taught by Niino et al. The Examiner has stated that it would have been obvious to one of ordinary skill in the art to utilize the cleaning process of Niino et al. with the hot filament CVD process of Matsuyama with the reasonable expectation of successfully activating the cleaning gas using the hot filament of Matsuyama and etching/removing the undesired film on the interior surface of the reaction chamber in a plasma-free process as taught by Niino et al. The Examiner stated that in doing so one of ordinary skill in the art would have had the reasonable expectation that the CIF3 cleaning gas of Niino et al. would not have damaged the platinum hot element of Matsuyama, since

Matsuyama teaches that platinum is chosen for use in the hot element due to its corrosion resistance. However, applicant submits that platinum will not remain stable in a cleaning gas atmosphere such as CF₄ or CIF₃ at high temperatures. For instance, Niino et al. state that the chamber should be heated to at least 400° C because the practical etching rate cannot be obtained at a low temperature. From this it follows that the etching rate increases with an increase in the temperature or, alternatively, the corrosion resistance of material decreases with an increase in the temperature. Thus, the fact that platinum is stable in the presence of a corrosive cleaning gas even at a high temperature such as, for instance, 1000° C was not known to a person of ordinary skill in the art.

Applicant therefore respectfully submits that it would not have been obvious to one of ordinary skill in the art to combine the teachings of Matsuyama and Niino et al. to arrive at Applicant's claimed invention.

Applicant further submits that the method of Niino et al. cannot be practiced with the apparatus of Matsuyama. Matsuyama heats a heating element. Niino et al. heat the chamber to a very high temperature. Applicant submits that the two teachings therefore cannot be combined and that one in the art would not have recognized that the two teachings could have been combined.

Finally, the Examiner stated, correctly, that it is not explicitly stated that the activated cleaning gas of Niino et al. converts the deposited film into a gaseous substance for removal. Applicant agrees. Applicant also submits that it is also not implied in Niino et al. that the deposited film is converted into a gaseous substance which can be removed.

For all of the above reasons, Applicant respectfully submits that claims 11, 12, 15, and 16 are not obvious in view of the cited references.

Claims 13-16 depend from claim 11 and therefore also distinguish and are not obvious in view of the cited prior art.

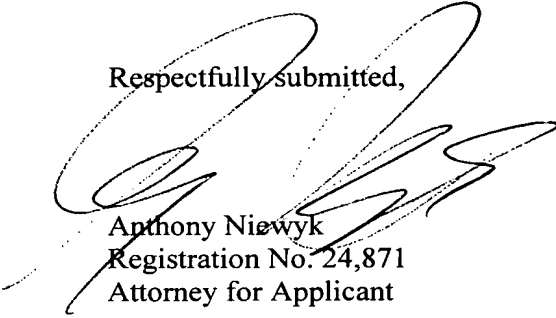
In view of the foregoing Applicant respectfully submits that all claims at issue are in condition for allowance and respectfully requests allowance thereof.

In the event Applicant has overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby petitions therefore and authorizes that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

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Should the Examiner have any further questions, he is respectfully invited to telephone the undersigned at 219-460-1695.

Respectfully submitted,


Anthony Niewyk
Registration No. 24,871
Attorney for Applicant

AN/mh

BAKER & DANIELS
111 East Wayne Street, Suite 800
Fort Wayne, IN 46802
Telephone: 219-424-8000
Facsimile: 219-460-1700

Enc. – Petition For Extension Of Time
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I HEREBY CERTIFY THAT THIS correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on: November 5, 2001

ANTHONY NIEWYK, REG. NO. 24,871

Name of Registered Representative


Signature

November 5, 2001

Date